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ABSTRACT

This instructor's resource guide is designed to accompany the student modules in the occupational subject area of trade and industrial education. The guide defines safety and health training needs in the various occupations; describes the modules and their use; and encourages instructors to consider the safety and health needs of all students. In Section I some common safety and health problems in the occupational area of trade and industrial education are cited. Section II provides the instructor with a short narrative of the content of each related student module. The third section identifies the basic components (introduction, objectives, subject matter, activities, references) of the 50 student modules in this program and describes the function of each of the various parts. Followup activities and module format are also described, and presentation approaches are suggested. In Section IV, a brief summary of some of the considerations of special-needs students is given. The final section concerns student certification procedures. Appended is a list of the 50 module titles. (CT)

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SAFETY AND HEALTH FOR TRADE AND INDUSTRIAL EDUCATION

AN INSTRUCTOR RESOURCE GUIDE

Developed for
THE U. S. DEPARTMENT OF EDUCATION
OFFICE OF VOCATIONAL AND ADULT EDUCATION

Developed by
THE CENTER FOR OCCUPATIONAL RESEARCH AND DEVELOPMENT
(Formerly Technical Education Research Center – Southwest)
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CE 031 457

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PREFACE

In the 40 minutes required to read and study this Instructor Resource Guide, one worker somewhere in the United States will be fatally injured in an on-the-job accident. More than 160 workers will have suffered disabling injuries, and several million dollars will have been spent or lost as a result of these deaths and injuries. In addition, at least 344,000 cases of occupational disease are reported annually among the 75 million emloyees in the labor force.

Because a majority of job-related accidents involve workers within their first six months of employment, safety and health information should be provided during preemployment training. Unnecessary exposure to potential health hazards can be minimized if proper training is provided. Health and safety information, the development of a positive safety attitude, and safe working procedures should be part of the curriculum for every vocational or occupational student. This can be accomplished by providing a separate health and safety course or, more easily, by infusing the information into appropriate, existing classes.

A series of separate instructional modules have been developed to facilitate the process of including safety and health instruction in existing curricula. Modules in the series that are appropriate for occupations in Trade and Industrial Education have been identified in this Resource Guide, which is one of seven related to different occupational clusters. The modules are adaptable to secondary, postsecondary, and adult education programs, including industry-based training and retraining programs.

The purpose of this Instructor Resource Guide is to familiarize you, the instructor, with the instructional materials developed and to suggest a systematic method for their use. Health and safety needs for the Trade and Industrial Education cluster will be described in Section I, including a definition of the cluster. The modules recommended for inclusion will be described in Section II. Various ways to use the modules are found in Section III. The fourth section describes mechanisms helpful in identification of special safety and health considerations for handicapped students/workers. The final section provides information concerning certification of students who successfully complete a training program that includes these modules.

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INTRODUCTION

When someone is asked to perform a new job, some form of training or instruction normally is provided. The training may be as brief as a few seconds of verbal directions or as extensive as months of intensive academic and apprenticeship preparation. The number of workers who annually sustain job-related disabling injuries and illnesses indicates that safety and health information may not be adequately presented in many training programs.

Safety and health information often is acquired only as a by-product of job-related responsibilities. In many cases, observation of experienced co-workers may be the only mechanism provided for training. This uncontrolled type of learning frequently leads to development of improper or unsafe work practices by the new worker. If the new employee does not possess a basic understanding of safety and health aspects of the job and a positive safety attitude, the potential for an on-the-job accident is greatly increased.

The Trade and Industrial Education cluster contains the largest number of jobs found in any of the seven commonly-recognized clusters. This Guide will identify and describe 33 program areas in this cluster. The 33 program areas contain thousands of specific job titles and employ millions of workers. It is probably safe to assume, in fact, that at least one-half of the work force could be described as belonging to this cluster. Certain program areas in this cluster and their associated occupations are responsible for significantly more than their share of the accidents. Construction, for example, employs about 5% of the workforce but accounted for 19% of all fatalities in 1979.* The same source of information indicates that more than one-half of the fatalities in construction resulted from falls, with another 30% suffering electrocution. As a group, manufacturing accounted for at least 3,000 work-related fatalities attributed to fires.

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*"News, United States Department of Labor," Office of Information, USDL-80-727, Nov. 20, 1980, Washington, D.C. 20210.

This data cannot be ignored if the number of injuries and fatalities are to be reduced. One mechanism that can be used to reduce these numbers is to provide safety and health training using current, applicable, and easy to use learning materials.

In response to the need for safety and health instruction, the U.S. Department of Education sponsored a project to develop 50 safety and health instructional modules. Each module addresses a separate topic and is self-contained. The first ten modules in the series (SH-01 through SH-10) are referred to as "core" modules and contain basic safety and health information useful to almost every occupation in the Trade and Industrial Education cluster. From the remaining 40 specific modules, 36 have been recognized as having content that may be appropriate for Trade and Industrial Education students, depending on their vocational and occupational goals. A complete list of all 50 module titles is included in Appendix A. This "shopping list" of modules permits you to select the exact safety and health information your students need. The modular form of presentation allows you to infuse modules when and as they are appropriate in your instructional plan.

SECTION I

HEALTH AND SAFETY IN TRADE AND INDUSTRIAL EDUCATION

A thirty-five year old industrial electrician with nine years of electrical experience died of elctrocution when his body contacted bare terminals in the control panel on which he was installing legend lights.

As a laborer attempted to attach a chain for moving a ton-and-a-half tower base that had been stored on edge, the tower base fell on her, crushing her to death.

A maintenance mechanic was fatally injured by the explosion of gases within a tank over which he was welding.

A scaffold worker was thrown five floors to the ground when his long hair was pulled into the electric winch as he lowered the scaffold.

Seven deaths occurred in a commercial dry-cleaning establishment when a flash fire occurred. The seven employees were in an area that had the emergency exit secured with a chain and lock.

It was a hot August day and the machine shop was not air conditioned. All machine tooling operators, however, had been instructed to wear proper protective equipment, including safety glasses. When a newly-hired machinist observed some of the senior operators not wearing their glasses he took his off. A few minutes later a piece of metal was thrown from his lathe, striking him and creating permanent blindness in one eye.

Normally, the large container of cookie dough was moved about on a three-wheel carrier. In this case, the baker's helper had forgotten to put the container on the carrier, and she was supposed to get the container to the other side of the kitchen. She bent over and lifted the container to carry it to the work table. She felt a burning pain in her lower back, but tried to ignore it until several days later. An examination by a physician revealed a ruptured disc.

Thousands of workers each year suffer similar accidents, some even fatal, many of which could have been avoided if fundamental safety rules had been applied. Carelessness is certainly the cause of many accidents; others, however, are due to the worker not being aware of proper safety procedures. The result is almost always the same - lost work time, reduced

productivity, and unneeded pain suffered. You have the opportunity to reduce these statistics by providing your students with needed safety and health instruction.

A significant majority of these accidents will occur to workers within the first six months of their time on the job. While you are providing these entering workers with job skills, why not provide them with the safety and health instruction they need to survive their initial term of employment?

TRADE AND INDUSTRIAL EDUCATION PROGRAM AREAS

The Trade and Industrial Education cluster includes a significant majority of the employees representing the entire work force. Workers in this cluster are engaged in a variety of occupations concerned with all phases of fabrication and products processing, as well as performing services.

For the purpose of this Instructor Resource Guide, the Trade and Industrial Occupations cluster has been divided into 34 instructional program areas, as follows:

- Air Conditioning.
- Appliance Repair.
- Automotive Services.
- Aviation Occupations.
- Blueprint Reading.
- Business Machine Maintenance.
- Commercial Art Occupations.
- Commercial Fishery Occupations.
- Commercial Photography Occupations.
- Construction and Maintenance Trades.
- Custodial Services.
- Diesel Machines.
- Drafting.
- Electrical Occupations.
- Electronic Occupations.
- Fabric Maintenance Services.

- Foremanship, Supervision and Management Development.
- Graphic Arts Occupations.
- Industrial Atomic Energy.
- Instrument Maintenance and Repair.
- Maritime Occupations.
- Metalworking.
- Metallurgy.
- Personal Services.
- Plastics Occupations.
- Public Service Occupations.
- Quantity Food Occupations.
- Refrigeration.
- Small Engine Repair (internal combustion).
- Stationary Engine Sources Occupations.
- Textile Production and Fabrication.
- Leatherworking.
- Upholstering.
- Woodworking.

Each area will be described briefly, specific health and safety hazards listed, and some of the common employment groups and recommended modules identified. The modules are numerically sequenced, but numbers do not represent order of presentation.

The first ten modules of the JSHIM series (SH-01 through SH-10) are core modules and contain some information useful to workers in all occupations of the Trade and Industrial Education cluster. Of the remaining 40 specific modules, those of which all or parts might apply are listed with each area.

Air Conditioning - THese workers apply the theories and principles of temperature and humidity control for closed environments. Training is provided in the diagnosis of mechancial malfunctions, overhaul, repair, and adjustment of units and parts such as pumps, compressors, valves, springs, and connections, as well as the repair of electric and pneumatic controls. Three specific job areas can be defined including:

- Cooling.
- Heating.
- Ventilating.

A variety of hazards are common to this area, most obvious are electrical and compressed gas hazards.

Consider the following specific modules for this area:

SH-12 Personal Protective Equipment
SH-14 Using Ropes, Chains and Slings Safely
SH-16 Material Hoist Safety
SH-18 Safe Operation of Commercial Vehicles
SH-19 Safety with Hand and Portable Power Tools
SH-22 Ladder and Scaffolding Safety
SH-24 Machine and Woodworking Tool Safety
SH-25 Safety Features of Material and Personnel Movement Devices
SH-26 Safety for Compressed Gas and Air Equipment
SH-28 Welding, Cutting and Brazing Safety
SH-29 Hazardous Materials Safety
SH-30 Safe Handling and Use of Flammable and Combustible Materials
SH-31 Overcurrent and Electrical Shock Protection
SH-33 Vibration and Noise Control
SH-34 Safety Guards for Machinery
SH-44 Exhaust, Dust Collection, and Ventilation Systems

Appliance Repair - Workers in this program area complete repairs on small appliances such as washers, dryers, toasters, water heaters, etc. Training is provided in electrical circuitry, gearing, linkages, and lubrication for the operation, maintenance, and repairs of components such as relays, timers, pumps and agitators. At least two employment areas can be noted, including:

- Electrical applicances.
- Gas appliances.

The most common hazard for these workers is electricity but others, such as the tools used for repairs, can also present hazardous situations.

Consider the following specific modules for this area:

SH-12 Personal Protective Equipment
SH-14 Using Ropes, Chains and Slings Safely
SH-16 Material Hoist Safety
SH-18 Safe Operation of Commercial Vehicles
SH-19 Safety with Hand and Portable Power Tools

SH-22 Ladder and Scaffolding Safety
SH-24 Machine and Woodworking Tool Safety
SH-25 Safety Features of Material and Personnel Movement Devices
SH-26 Safety for Compressed Gas and Air Equipment
SH-28 Welding, Cutting and Brazing Safety
SH-29 Hazardous Materials Safety
SH-30 Safe Handling and Use of Flammable and Combustible Materials
SH-31 Overcurrent and Electrical Shock Protection
SH-33 Vibration and Noise Control
SH-34 Safety Guards for Machinery
SH-44 Exhaust, Dust Collection, and Ventilation Systems

Automotive Services - These workers perform all phases of automotive maintenance and repair work. Training includes the diagnosis of malfunctions, disassembly of units, parts inspection, and repair or replacement of parts involving engine overhaul, ignition systems, carburetion, brakes, transmission, front-end alignment, body repair, and accessory installation. At least three separate employment areas can be defined including:

- Body and fender repair.
- Mechanic.
- Specialized maintenance.

Each of these areas has equipment and materials associated with the work activity that can be hazardous when used improperly.

Consider the following specific modules for this area:

SH-12 Personal Protective Equipment
SH-14 Using Ropes, Chains and Slings Safely
SH-16 Material Hoist Safety
SH-19 Safety with Hand and Portable Power Tools
SH-24 Machine and Woodworking Tool Safety
SH-25 Safety Features of Material and Personnel Movement Devices
SH-26 Safety for Compressed Gas and Air Equipment
SH-28 Welding, Cutting and Brazing Safety
SH-29 Hazardous Materials Safety
SH-30 Safe Handling and Use of Flammable and Combustible Materials
SH-31 Overcurrent and Electrical Shock Protection
SH-33 Vibration and Noise Control
SH-34 Safety Guards for Machinery
SH-44 Exhaust, Dust Collection, and Ventilation Systems

Aviation Occupations - Workers in this program area perform all phases of ground support activities related to aircraft maintenance and operation. At least the following three separate job categories can be distinguished for these workers:

- Aircraft maintenance.
- Airframe maintenance.
- Power plant maintenance.

The first category (aircraft maintenance) is somewhat general and can include activities found in the other two categories. As a group, all three categories use or are exposed to hazardous equipment, tools, and chemicals.

Consider the following specific modules for this area:

SH-12 Personal Protective Equipment
SH-14 Using Ropes, Chains and Slings Safely
SH-16 Material Hoist Safety
SH-19 Safety with Hand and Portable Power Tools
SH-22 Ladder and Scaffolding Safety
SH-24 Machine and Woodworking Tool Safety
SH-25 Safety Features of Material and Personnel Movement Devices
SH-26 Safety for Compressed Gas and Air Equipment
SH-28 Welding, Cutting and Brazing Safety
SH-29 Hazardous Materials Safety
SH-30 Safe Handling and Use of Flammable and Combustible Materials
SH-31 Overcurrent and Electrical Shock Protection
SH-32 Working Safely in Confined Spaces
SH-33 Vibration and Noise Control
SH-44 Exhaust, Dust Collection, and Ventilation Systems

Blueprint Reading - These workers often perform support activities critical for other occupational areas. Training includes learning to prepare, develop, and interpret blueprints.

Chemical hazards may be present during the development of the blueprints. Other hazards might include those common to the office environment.

Consider the following specific modules for this area:

SH-11 Business and Office Safety
SH-12 Personal Protective Equipment
SH-25 Safety Features of Material and Personnel Movement Devices
SH-29 Hazardous Materials Safety
SH-35 Ionizing and Nonionizing Radiation Protection
SH-44 Exhaust, Dust Collection, and Ventilation Systems

Business Machine Maintenance - Workers in this program area maintain and repair a variety of business and office machines, including typewriters, calculators, data processing machines, duplicating machines, and mailing machines. Training and shop experience are provided using special hand and power tools and electronic testing devices.

Use of these tools and exposure to potential electrical shock are two major sources of hazards for workers in this program area.

Consider the following specific modules for this area:

SH-11 Business and Office Safety
SH-12 Personal Protective Equipment
SH-19 Safety with Hand and Portable Power Tools
SH-24 Machine and Woodworking Tool Safety
SH-28 Welding, Cutting and Brazing Safety
SH-31 Overcurrent and Electrical Shock Protection

Commercial Art Occupations - These workers are provided training that includes theory, laboratory, and shopwork in the design and execution of layouts and illustrations for advertising, display, and instructional manuals. Silk screening, airbrush and touchup, inks, and color dynamics are some of the activities performed by these workers. At least three occupational categories can be identified, including:

- Interior decoration.
- Window display.
- Product design.

Chemical hazards resulting from the paints and inks used are common for this program area.

Consider the following specific modules for this area:

SH-11 Business and Office Safety
SH-12 Personal Protective Equipment
SH-19 Safety with Hand and Portable Power Tools
SH-22 Ladder and Scaffolding Safety
SH-24 Machine and Woodworking Tool Safety
SH-25 Safety Features of Material and Personnel Movement Devices
SH-26 Safety for Compressed Gas and Air Equipment
SH-29 Hazardous Materials Safety
SH-30 Safe Handling and Use of Flammable and Combustible Materials
SH-44 Exhaust, Dust Collection, and Ventilation Systems

Commercial Fishery Occupations - Employees classified in this program area receive training in seamanship, navigation, communications, and utilization of rigging and other equipment. These workers perform maintenance and repair of boats, develop fish-finding techniques, understand shipboard preservation and refrigeration, perform onshore and offshore catch processing, and operate and maintain all fishing gear and power plants. At least two specialized job categories can be identified:

- Seamanship.
- Ship and boat operation and maintenance.

Many unique and unusual job hazards are present as these workers perform their duties. A variety of mechanical and climatic hazards present unusual difficulties for these workers.

Consider the following specific modules for this area:

SH-12 Personal Protective Equipment
SH-14 Using Ropes, Chains and Slings Safely
SH-16 Material Hoist Safety
SH-19 Safety with Hand and Portable Power Tools
SH-21 Marine and Longshoring Safety
SH-22 Ladder and Scaffolding Safety
SH-25 Safety Features of Material and Personnel Movement Devices
SH-26 Safety for Compressed Gas and Air Equipment
SH-28 Welding, Cutting and Brazing Safety
SH-29 Hazardous Materials Safety
SH-30 Safe Handling and Use of Flammable and Combustible Materials
SH-32 Working Safely in Confined Spaces
SH-34 Safety Guards for Machinery
SH-36 Safety Features for Floor and Wall Openings and Stairways
SH-43 Safety Practices for Commercial Diving
SH-44 Exhaust, Dust Collection, and Ventilation Systems
SH-46 Chemical Hazards and Waste Disposal Safety and Health

Commercial Photography Occupations - These workers perform a variety of activities using cameras and photographic processing. Both laboratory and studio work are studied and practiced. Use of airbrushes, enlargers, printers, and processors represent some of the activities performed by those in commercial photography and photographic laboratory and darkroom occupations.

Chemicals used in film processing present hazards to workers in this program area, as does the use of some specialized equipment.

Consider the following specific modules for this area:

SH-11 Business and Office Safety
SH-12 Personal Protective Equipment
SH-19 Safety with Hand and Portable Power Tools
SH-26 Safety for Compressed Gas and Air Equipment
SH-29 Hazardous Materials Safety
SH-31 Overcurrent and Electrical Shock Protection
SH-35 Ionizing and Nonionizing Radiation Protection
SH-44 Exhaust, Dust Collection, and Ventilation Systems
SH-46 Chemical Hazards and Waste Disposal Safety and Health

Construction and Maintenance Trades - Workers in this program area perform building and maintenance activities for structures, highways, airports, missile sites, etc. Training is provided for cutting, fitting, fastening, and finishing building materials such as metal, wood, stone, brick, glass, concrete, or composition substances. At least ten job categories can be identified, including:

- Carpentry.
- Electricity.
- Heavy equipment.
- Masonry.
- Painting and decorating.
- Plastering.
- Plumbing and Pipefitting.
- Dry-wall installation.
- Glazing.
- Roofing.

These job categories represent several hundred job titles, each including tasks that expose workers to many hazards. Falls are the most common source of construction-related accidents and fatalities, but other job-specific hazards also exist.

Consider the following specific modules in this area:

SH-11 Business and Office Safety
SH-12 Personal Protective Equipment
SH-13 Industrial Sanitation and Personal Facilities

SH-14 Using Ropes, Chains and Slings Safely
SH-16 Material Hoist Safety
SH-17 Mechanized Off-Road Equipment Safety
SH-18 Safe Operation of Commercial Vehicles
SH-19 Safety with Hand and Portable Power Tools
SH-20 Precautions for Explosive Materials
SH-22 Ladder and Scaffolding Safety
SH-24 Machine and Woodworking Tool Safety
SH-25 Safety Features of Material and Personnel Movement Devices
SH-26 Safety for Compressed Gas and Air Equipment
SH-28 Welding, Cutting and Brazing Safety
SH-29 Hazardous Materials Safety
SH-30 Safe Handling and Use of Flammable and Combustible Materials
SH-31 Overcurrent and Electrical Shock Protection
SH-32 Working Safely in Confined Spaces
SH-33 Vibration and Noise Control
SH-34 Safety Guards for Machinery
SH-36 Safety Features for Floor and Wall Openings and Stairways
SH-37 Safety of Concrete, Forms, and Shoring
SH-38 Excavating, Trenching, and Shoring Safety
SH-39 Steel Erection Safety
SH-40 Electrical Power Transmission and Distribution Safety
SH-41 Safety Practices for Demolition Procedures
SH-42 Safe Use of Powered Industrial Trucks
SH-44 Exhaust, Dust Collection, and Ventilation Systems
SH-46 Chemical Hazards and Waste Disposal Safety and Health

Custodial Services - These workers receive training in all phases of the care and cleaning of buildings, fixtures, and furnishings. A variety of interiors including linoleum, plastic, terrazzo, tile, and wood floors; and rugs, wood panel, paint, and synthetic wall coverings are discussed and used during classroom and shop experience.

A variety of hazardous chemicals and cleaning equipment is used by these workers as they disinfect and sanitize areas.

Consider the following specific modules for this area:

SH-11 Business and Office Safety
SH-12 Personal Protective Equipment
SH-13 Industrial Sanitation and Personal Facilities
SH-19 Safety with Hand and Portable Power Tools
SH-22 Ladder and Scaffolding Safety
SH-25 Safety Features of Material and Personnel Movement Devices
SH-29 Hazardous Materials Safety
SH-31 Overcurrent and Electrical Shock Protection

SH-44 Exhaust, Dust Collection, and Ventilation Systems
SH-46 Chemical Hazards and Waste Disposal Safety and Health

Diesel Mechanic - Workers in this program area are concerned with all phases of repair work on diesel engines used to power vehicles and vessels. Instruction and practice are provided in the diagnosis of malfunctions, disassembly, repair and adjustment of fuel injection systems.

Diesel mechanics use a variety of hand and power tools as well as testing and diagnostic equipment as they perform various tasks. Chemical and equipment hazards must be recognized by workers in this program area.

Consider the following specific modules for this area:

SH-12 Personal Protective Equipment
SH-14 Using Ropes, Chains and Slings Safely
SH-16 Material Hoist Safety
SH-17 Mechanized Off-Road Equipment Safety
SH-19 Safety with Hand and Portable Power Tools
SH-30 Safe Handling and Use of Flammable and Combustible Materials
SH-42 Safe Use of Powered Industrial Trucks

Drafting Occupations - Those workers employed in jobs identified in this program area gather and translate data or specifications while preparing scaled drawings. Instruction provides experience in drawing, reproducing materials, equipment, and processes while preparing reports and data sheets.

Hazards common to these workers are found in all office environments and also as a result of working with various tools and testing equipment.

Consider the following specific modules in this area:

SH-11 Business and Office Safety
SH-19 Safety with Hand and Portable Power Tools
SH-25 Safety Features of Material and Personnel Movement Devices
SH-44 Exhaust, Dust Collection, and Ventilation Systems

Electrical Occupations - Workers in these occupations are concerned with various phases of generating and transmitting electricity, installing and maintaining electrical communications systems, and repairing and maintaining electrical equipment and components. At least the following three job categories can be described:

- Industrial electrician.
- Lineman.
- Motor repairman.

An obvious hazard encountered is the electricity with which these persons must work on a daily basis. Other hazards include the need for these workers to use ladders and climb structures where footing may be unsure, and their use of a variety of hand and portable power tools.

Consider the following specific modules in this area:

SH-12 Personal Protective Equipment
SH-14 Using Ropes, Chains and Slings Safely
SH-16 Material Hoist Safety
SH-19 Safety with Hand and Portable Power Tools
SH-22 Ladder and Scaffolding Safety
SH-24 Machine and Woodworking Tool Safety
SH-25 Safety Features of Material and Personnel Movement Devices
SH-31 Overcurrent and Electrical Shock Protection
SH-36 Safety Features for Floor and Wall Openings and Stairways
SH-40 Electrical Power Transmission and Distribution Safety

Electronic Occupations - Those workers employed in electronics occupations plan, produce, test, assemble, install, and maintain electronic communications equipment such as radios, radar and television; industrial electronic equipment including digital computers; new electronic systems, components, and equipment; and control devices. At least three job categories exist in this program area:

- Communications.
- Industrial electronics.
- Radio/television.

The variety of work settings, from an office to in-home equipment repair or installations, creates hazards for these workers. Electrical shock and potentially dangerous tools and equipment are everyday hazards experienced by these workers.

Consider the following specific modules for this area:

SH-11 Business and Office Safety
SH-12 Personal Protective Equipment
SH-14 Using Ropes, Chains and Slings Safely
SH-16 Material Hoist Safety

SH-19 Safety with Hand and Portable Power Tools
SH-22 Ladder and Scaffolding Safety
SH-25 Safety Features of Material and Personnel Movement Devices
SH-31 Overcurrent and Electrical Shock Protection
SH-35 Ionizing and Nonionizing Radiation Protection
SH-40 Electrical Power Transmission and Distribution Safety

Fabric Maintenance Services - These workers clean and maintain all types of fabrics and garments. They receive instruction that emphasizes identifying, marking and entering, sorting, assembling, wrapping, and bagging clothing and other fabrics. At least two job categories can be identified for this program area:

- Dry cleaning.
- Laundering.

During processing and handling of these fabric items, workers are exposed to dry-cleaning and spotting agents, detergents, bleaches, and dyes; and to the use of hand tools and power equipment.

Consider the following specific modules for this area:

SH-12 Personal Protective Equipment
SH-13 Industrial Sanitation and Personal Facilities
SH-19 Safety with Hand and Portable Power Tools
SH-23 Warehousing, Storage and Retrieval Safety
SH-25 Safety Features of Material and Personnel Movement Devices
SH-29 Hazardous Materials Safety
SH-30 Safe Handling and Use of Flammable and Combustible Materials
SH-31 Overcurrent and Electrical Shock Protection
SH-44 Exhaust, Dust Collection, and Ventilation Systems
SH-46 Chemical Hazards and Waste Disposal Safety and Health

Foremanship, Supervision, and Management Development - These employees are found in a broad range of crafts, trades, and industry. Normally, a combination of occupational knowledge and management skills are needed by these workers. The instructional program often will include the study of human behaviors; organization and management; oral communications; labor laws; personnel procedures; job analysis; work simplification; employee utilization; development of writing techniques; and safety and first aid practices.

Consider the following specific modules for this area:

SH-11 Business and Office Safety
SH-12 Personal Protective Equipment
SH-13 Industrial Sanitation and Personal Facilities
SH-48 OSHA Training Programs
SH-49 Establishing a Company Safety and Health Program

Additional modules should also be considered as they apply to the potential work setting of your students.

Graphic Arts Occupations - Workers in these occupations receive training in all phases of hot and cold typesetting, layouts, composition, press-work, and binding; including flexography, lithography, photoengraving, and other graphic arts related to the printing industry. At least six job categories can be described for this program area, including:

- Composition, makeup and typesetting.
- Printing press occupations.
- Lithography, photography, and platemaking.
- Photoengraving.
- Silk screen making and printing.
- Bookbinding.

A variety of equipment hazards exist for workers in these areas. Exposure to a variety of chemicals, dyes, and inks is common.

Consider the following specific modules for this area:

SH-11 Business and Office Safety
SH-12 Personal Protective Equipment
SH-19 Safety with Hand and Portable Power Tools
SH-24 Machine and Woodworking Tool Safety
SH-29 Hazardous Materials Safety
SH-30 Safe Handling and Use of Flammable and Combustible Materials
SH-31 Overcurrent and Electrical Shock Protection
SH-34 Safety Guards for Machinery
SH-35 Ionizing and Nonionizing Radiation Protection
SH-44 Exhaust, Dust Collection, and Ventilation Systems

Industrial Atomic Energy - Employees in industrial atomic energy occupations are trained in two basic areas that include (1) construction, operation, and maintenance of reactor plants and industrial X-ray equipment,

and (2) industral uses of radioisotopes for production and control operations. At least three job categories can be described:

- Installation, operation and maintenance of reactors.
- Radiography.
- Industrial radioisotope uses.

Almost every form of mechanical, electrical, electronic, and chemical skills and equipment generally used in industry may be involved. A broad range of hazards exists for these workers.

Consider the following specific modules for this area:

SH-12 Personal Protective Equipment
SH-13 Industrial Sanitation and Personal Facilities
SH-19 Safety with Hand and Portable Power Tools
SH-25 Safety Features of Material and Personnel Movement Devices
SH-29 Hazardous Materials Safety
SH-31 Overcurrent and Electrical Shock Protection
SH-32 Working Safely in Confined Spaces
SH-35 Ionizing and Nonionizing Radiation Protection
SH-36 Safety Features for Floor and Wall Openings and Stairways
SH-44 Exhaust, Dust Collection, and Ventilation Systems
SH-46 Chemical Hazards and Waste Disposal Safety and Health

Instrument Maintenance and Repair - Workers in these occupations maintain and repair meters, instruments, watches and clocks, and other physical measuring devices. Training is received in diagnosing malfunctions; disassembling, repairing and/or replacing faulty parts; cleaning, assembling and adjusting; and using special bench and hand tools, meters and standards. At least two job categories can be described in this program area, including:

- Instruments.
- Watchmaking and repair.

The unique tools used by these workers, especially during repairs to an instrument in its housing, present hazards for employees. Other hazards exist as a result of the material controlled by gages and devices that have malfunctioned.

Consider the following specific modules for this area:

SH-11 Business and Office Safety
SH-12 Personal Protective Equipment
SH-19 Safety with Hand and Portable Power Tools

SH-26 Safety for Compressed Gas and Air Equipment
SH-31 Overcurrent and Electrical Shock Protection
SH-44 Exhaust, Dust Collection, and Ventilation Systems

Maritime Occupations - These workers are prepared for a variety of tasks that relate to freshwater and seagoing vessels or structures. Students are taught firefighting, lifeboat work, and swimming for emergency situations. Emphasis is placed on fiber and wire rope handling and splicing, chipping and painting of hulls, cargo-handling gear and ground tackle. Maintenance, operation, repair, and service to main engines and auxiliary steam, refrigeration, water, and electrical systems are also part of the tasks performed by these workers.

Consider the following specific modules for this area:

SH-12 Personal Protective Equipment
SH-14 Using Ropes, Chains and Slings Safely
SH-16 Material Hoist Safety
SH-19 Safety with Hand and Portable Power Tools
SH-21 Marine and Longshoring Safety
SH-22 Ladder and Scaffolding Safety
SH-24 Machine and Woodworking Tool Safety
SH-25 Safety Features of Material and Personnel Movement Devices
SH-29 Hazardous Materials Safety
SH-30 Safe Handling and Use of Flammable and Combustible Materials
SH-31 Overcurrent and Electrical Shock Protection
SH-32 Working Safely in Confined Spaces
SH-33 Vibration and Noise Control
SH-34 Safety Guards for Machinery
SH-44 Exhaust, Dust Collection, and Ventilation Systems

Metalworking - These workers are trained through organized and specialized learning experiences that include theory, laboratory, and shop work as they relate to the plan, manufacture, assembly, test, and repair of parts, mechanisms, machines, and structures in which materials are cast, formed, shaped, molded, heat treated, cut, twisted, bent, pressed, stamped, fused, marked, or otherwise worked upon.

At least these nine job categories can be identified in this program area:

- Foundry.
- Machine shop.
- Welding and cutting.
- Tool and die making.

- Machine tool operation.
- Metal trades (combined).
- Sheet metal.
- Die sinking.
- Metal patternmaking.

This program area includes a wide diversity of occupational opportunity. Each job category has a specific set of hazards relative to the equipment used, the material worked with, and chemicals essential to the tasks performed.

Consider the following specific modules in this area:

SH-12 Personal Protective Equipment
SH-14 Using Ropes, Chains and Slings Safely
SH-16 Material Hoist Safety
SH-19 Safety with Hand and Portable Power Tools
SH-22 Ladder and Scaffolding Safety
SH-24 Machine and Woodworking Tool Safety
SH-26 Safety for Compressed Gas and Air Equipment
SH-28 Welding, Cutting and Brazing Safety
SH-29 Hazardous Materials Safety
SH-30 Safe Handling and Use of Flammable and Combustible Materials
SH-31 Overcurrent and Electrical Shock Protection
SH-32 Working Safely in Confined Spaces
SH-33 Vibration and Noise Control
SH-34 Safety Guards for Machinery
SH-39 Steel Erection Safety
SH-44 Exhaust, Dust Collection, and Ventilation Systems

Personal Services - Workers preparing to enter the workforce in personal services are provided planned learning experiences related to the physical appearance of individuals. These experiences include giving various kinds of beauty treatment, applying makeup to faces of studio and stage performers, attending clients taking baths, administering elementary massage, and fitting wigs.

At least two job categories can be identified for workers in this program area:

- Barbering.
- Cosmetology.

The chemicals and tools used by these workers present hazards when improperly used or stored.

Consider the following specific modules for this area:

SH-11 Business and Office Safety

SH-12 Personal Protective Equipment
SH-13 Industrial Sanitation and Personal Facilities
SH-29 Hazardous Materials Safety
SH-31 Overcurrent and Electrical Shock Protection
SH-44 Exhaust, Dust Collection, and Ventilation Systems

Plastics Occupations - These workers are provided classroom and shop experiences dealing with plastics and their characteristics, and with bench molding, fitting, internal carving, and finishing plastics and fiberglass materials into products. Instruction includes use of hand and power tools.

Safety and health hazards are present in the tools and chemical materials used in product preparation and processing.

Consider the following specific modules for this area:

SH-12 Personal Protective Equipment
SH-19 Safety with Hand and Portable Power Tools
SH-29 Hazardous Materials Safety
SH-30 Safe Handling and Use of Flammable and Combustible Materials
SH-44 Exhaust, Dust Collection, and Ventilation Systems
SH-46 Chemical Hazards and Waste Disposal Safety and Health

Public Service Occupations - Workers in these occupations usually are concerned with specialized activities - limited to local, county, state, and federal governments - that do not occur elsewhere in the economy. Typical activities include police and fire protection, emergency rescue squad work, safety, sanitation, transportation, and school bus driving.

At least these two job categories can be identified in this program area:

- Fireman training.
- Law enforcement.

Specific hazards result during the performance of their duties for which these workers must be extremely well prepared.

Consider the following specific modules for this area:

SH-12 Personal Protective Equipment
SH-13 Industrial Sanitation and Personal Facilities
SH-14 Using Ropes, Chains and Slings Safely
SH-16 Material Hoist Safety
SH-19 Safety with Hand and Portable Power Tools

SH-22 Ladder and Scaffolding Safety
SH-25 Safety Features of Material and Personnel Movement Devices
SH-26 Safety for Compressed Gas and Air Equipment
SH-28 Welding, Cutting and Brazing Safety
SH-29 Hazardous Materials Safety
SH-30 Safe Handling and Use of Flammable and Combustible Materials
SH-31 Overcurrent and Electrical Shock Protection
SH-32 Working Safely in Confined Spaces
SH-44 Exhaust, Dust Collection, and Ventilation Systems
SH-47 Safety and Health in Vocational Education
SH-48 OSHA Training Programs
SH-49 Establishing a Company Safety and Health Program

Quantity Food Occupations - Workers in the quantity food occupations program area are provided organized learning that includes theory and practical experiences as they relate to planning, selection, purchase, preservation, preparation, and serving of food and food products. Included is the study of a variety of foods and their nutritional values, food processing, quantity cooking, equipment storage, and sanitation in food handling and management.

At least four job categories can be identified in this program area, including:

- Baker.
- Cook/chef.
- Meatcutter.
- Waiter/waitress.

Equipment used in food processing and preparation presents hazards for these workers. Equally important for this program area is a thorough understanding of sanitation and proper housekeeping activities.

Consider the following specific modules for this area:

SH-12 Personal Protective Equipment
SH-13 Industrial Sanitation and Personal Facilities
SH-19 Safety with Hand and Portable Power Tools
SH-25 Safety Features of Material and Personnel Movement Devices
SH-31 Overcurrent and Electrical Shock Protection
SH-44 Exhaust, Dust Collection, and Ventilation Systems

Refrigeration - These workers are provided classroom and shop experiences concerned with commercial chilling and freezing systems, including theory, application, and operation of compressors, expansion and float valves, thermostats, and pressure controls; diagnosis, overhaul, and testing methods and procedures; charging and discharging of systems with refrigerants; and testing hermetic units, relays, and overload devices. Hazards for these workers include working with (1) pressurized gases, (2) electrically powered systems, and (3) hand and portable power tools.

Consider the following specific modules for this area:

SH-12 Personal Protective Equipment
SH-16 Material Hoist Safety
SH-19 Safety with Hand and Portable Power Tools
SH-26 Safety for Compressed Gas and Air Equipment
SH-28 Welding, Cutting and Brazing Safety
SH-29 Hazardous Materials Safety
SH-31 Overcurrent and Electrical Shock Protection
SH-33 Vibration and Noise Control

Small Engine Repair, Internal Combustion - These workers are given classroom and shop experience in maintenance and repair of a variety of small engines used on portable power equipment, e.g., lawnmowers, outboard motors, chain saws, and rotary tillers.

Work with these engines presents hazards through the use of combustible materials (such as gasoline) and the various tools and equipment used in the repair and maintenance process.

Consider the following specific modules for this area:

SH-12 Personal Protective Equipment
SH-16 Material Hoist Safety
SH-19 Safety with Hand and Portable Power Tools
SH-29 Hazardous Materials Safety
SH-30 Safe Handling and Use of Flammable and Combustible Materials
SH-44 Exhaust, Dust Collection, and Ventilation Systems

Stationary Energy Sources Occupations - Workers in this program area are provided specialized learning experiences, including theory, laboratory, and shopwork, as each relates to the installation, operation, and

maintenance of large power sources for purposes such as generating electricity, pumping fluids, and heating. Major equipment involved may be turbines (steam, gas, or hydro), engines (diesel or gas), atomic reactors, or furnaces.

Job categories in at least two settings can be identified in this program area, including:

- Electric power generating plants.
- Pumping plants.

All workers in this program area must contend with a variety of mechanical hazards. Electrical hazards are common to these occupations. Those who work with pumps must be aware of leaks and explosions that may result from handling pressurized fluids. In some cases, the fluids themselves may be hazardous.

Consider the following specific modules for this area:

SH-12 Personal Protective Equipment
SH-13 Industrial Sanitation and Personal Facilities
SH-14 Using Ropes, Chains and Slings Safely
SH-16 Material Hoist Safety
SH-19 Safety with Hand and Portable Power Tools
SH-25 Safety Features of Material and Personnel Movement Devices
SH-26 Safety for Compressed Gas and Air Equipment
SH-29 Hazardous Materials Safety
SH-30 Safe Handling and Use of Flammable and Combustible Materials
SH-31 Overcurrent and Electrical Shock Protection
SH-33 Vibration and Noise Control
SH-34 Safety Guards for Machinery
SH-35 Ionizing and Nonionizing Radiation Protection
SH-36 Safety Features for Floor and Wall Openings and Stairways
SH-40 Electrical Power Transmission and Distribution Safety
SH-44 Exhaust, Dust Collection, and Ventilation Systems
SH-46 Chemical Hazards and Waste Disposal Safety and Health

Textile Production and Fabrication - These workers are given classroom and shop experience concerned with all aspects of fabrication of textiles and kindred materials. Instruction emphasizes the fabrication and repair of garments constructed of cotton, wool, synthetic fibers, or fur; apparel accessories (e.g., handbags, belts, shoes, and gloves); white

goods, such as sheets and pillowcases; and furnishings, such as slip-covers, draperies, and curtains.

At least these two job categories can be described for this program area:

- Dressmaking.
- Tailoring.

Not included in the to job categories above are approximately 300 job titles that relate to textile production and fabrication. Many of these workes operate specific machines in production and fabrication processes.

The various machines used in this program area present hazards to workers. Chemical and electrical hazards are also common problems.

Consider the following specific modules for this area:

SH-12 Personal Protective Equipment
SH-19 Safety with Hand and Portable Power Tools
SH-24 Machine and Woodworking Tool Safety
SH-25 Safety Features of Material and Personnel Movement Devices
SH-29 Hazardous Materials Safety
SH-31 Overcurrent and Electrical Shock Protection
SH-33 Vibration and Noise Control
SH-34 Safety Guards for Machinery
SH-44 Exhaust, Dust Collection, and Ventilation Systems

Leatherworking - Workers in this program area are given classroom and shop experience with fabrication and repair of all types of leather and artificial leather products. Instruction emphasizes types and care of footwear (e.g., shoes, boots, moccasins, sandals, and slippers); kinds and uses of tools and machines; shoe construction; shoe repair (including replacement of worn parts, such as heels and soles, and sewing parts that need mending); orthopedic shoemaking and repair; leather refinishing and dyeing; salesmanship; and simple bookkeeping. Repair of other articles such as handbags, luggage, and belts may be included in instruction.

At least two job categories can be identified for this program area, including:

- Shoe manufacture.
- Shoe repair.

Many specialized tools and equipment types are used in the processing or manufacture and repair of leather products. These machines present hazards for workers in this program area. Dyes and other chemicals used by these workers present additional health hazards.

Consider the following specific modules for this area:

SH-12 Personal Protective Equipment
SH-19 Safety with Hand and Portable Power Tools
SH-24 Machine and Woodworking Tool Safety
SH-25 Safety Features of Material and Personnel Movement Devices
SH-29 Hazardous Materials Safety
SH-31 Overcurrent and Electrical Shock Protection
SH-34 Safety Guards for Machinery
SH-44 Exhaust, Dust Collection, and Ventilation Systems

Upholstery - Workers in this program area receive classroom and shop experiences concerned with all aspects of upholstery, including furniture, automobile seats, caskets, mattresses, and bedsprings. Instruction includes installation, repair, arrangement, and securing of springs, filler, padding, and covering material; patternmaking; cutting, sewing, and trimming; outside coverings; cushion filling; styling and design; tufting and buttoning; and wood refinishing.

Use of specialized equipment such as pneumatic staplers and fabric-cutting devices is among the many potential hazards faced by these workers. Extremely hazardous chemicals are used daily by those involved in wood refinishing as well.

Consider the following specific modules for this area:

SH-12 Personal Protective Equipment
SH-16 Material Hoist Safety
SH-19 Safety with Hand and Portable Power Tools
SH-24 Machine and Woodworking Tool Safety
SH-25 Safety Features of Material and Personnel Movement Devices
SH-26 Safety for Compressed Gas and Air Equipment
SH-29 Hazardous Materials Safety
SH-31 Overcurrent and Electrical Shock Protection

SH-34 Safety Guards for Machinery
SH-44 Exhaust, Dust Collection, and Ventilation Systems

Woodworking - Workers being prepared in this program area are given classroom and shop experiences concerned with woodworking occupations other than construction carpentry. Instruction emphasizes layout and shaping of stock; assembly of complete wooden articles or subassemblies; marking, binding, sawing, carving, and sanding of wood products; and repair of wooden articles. Also emphasized are various hand and power tools and their uses.

At least one job category in this program area includes several job titles such as: millwork and cabinetmaking. Workers receive additional specialized class and practical work experiences concerned with mass production of items such as window frames, molding, trim, and panels; and with manufacture of such products as furniture, store fixtures, kitchen cabinets, and office equipment. Instruction includes training in cutting, shaping, and assembly of parts by means of hand tools and woodworking machines; refinishing furniture; installation of hardware (e.g., hinges, catches, and drawer pulls); layout planning; blueprint reading; drafting; and features of various kinds of woods.

A variety of mechanical and environmental hazards are present in work settings for these employees.

Consider the following specific modules for this area:

SH-12 Personal Protective Equipment
SH-16 Material Hoist Safety
SH-19 Safety with Hand and Portable Power Tools
SH-24 Machine and Woodworking Tool Safety
SH-25 Safety Features of Material and Personnel Movement Devices
SH-26 Safety for Compressed Gas and Air Equipment
SH-34 Safety Guards for Machinery
SH-44 Exhaust, Dust Collection, and Ventilation Systems

SECTION II

SAFETY AND HEALTH MODULES FOR TRADE AND INDUSTRIAL EDUCATION

Each Trade and Industrial Education teacher should develop a comprehensive plan for safety and health in the school program. This plan should be written to include rules and guidelines concerning:

1. Continuous supervision of students in the laboratory.
2. Safety demonstrations and lectures as an integral part of all instructional units.
3. Proper guarding on all machines.
4. Requirement that personal protective devices be worn.
5. Maintenance of laboratory and equipment in proper, safe condition.
6. Safe storage of materials, especially those that are toxic or flammable.
7. A system of written and performance safety tests to identify student competencies.
8. Periodic laboratory inspections.
9. An accident reporting and handling system.

Most accidents are preventable if the student or worker has had safety training; performs safe practices, uses only equipment in safe operating condition; and exercises prudent judgment.

The great diversity of occupations in Trade and Industrial Education makes it impractical to establish one safety and health program appropriate for all. To be useful then, any instructional materials for this group of occupations must be flexible enough to allow specific programs to be designed to meet individual student needs. Instruction utilizing modules has that flexibility.

The Job Safety and Health Instructional Materials (JSHIM) are packaged in a modular format. By definition, a module is considered to be a component of a larger entity. An instructional module is one that contains a discrete amount of information directly related to a specified set of instructional objectives. As an instructional module, it is also a component

of a more complete instructional system. A complete example module can be found in Appendix B.

CORE MODULES

Because the JSHIM modules were designed with the intent of their being useful to many occupations in a variety of occupational clusters, two separate groups of modules were created. One group consists of ten modules classified as "core" modules. Safety and health experts consider these topics to be fundamental to almost every occupational cluster. The ten modules are numbered SH-01 through SH-10 and include the following:

SH-01 MATERIALS HANDLING

Manual and mechanical methods for lifting, loading, and transporting materials are discussed, including the use of various aids such as ropes, chains, slings, conveyors, overhead cranes, dock plates, and hand and industrial trucks.

SH-02 THE ROLE OF OSHA IN SAFETY AND HEALTH

The Williams-Steiger Act is discussed, including rights and responsibilities of employees and employers under the Act. OSHA inspections are described; record-keeping requirements explained; and company training programs discussed.

SH-03 FUNDAMENTALS OF ELECTRICAL SAFETY

Basic electrical terminology and principles are discussed so that common electrical hazards can be understood. Safety features of equipment and OSHA requirements designed to protect workers from electrical hazards are explained.

SH-04 FIRST RESPONSE TO MEDICAL EMERGENCIES

Medical emergencies occur daily and may happen to anyone at anytime. This module is designed to inform students of actions that should be taken to aid the victim of such an emergency until professional medical personnel arrive. First aid procedures are outlined for seventeen common medical emergencies.

SH-05 FIRE PREVENTION AND EMERGENCY PROCEDURES

Fire and emergency procedures for fighting fires are discussed. Codes and regulations related to fire safety are explained. Fire detection and protection devices are also described.

SH-06 WALKING AND WORKING SURFACES

Many job-related accidents are caused by falls on or from such work areas as floors, stairways, exits, ladders, and scaffolds. Safety precautions and regulations governing these surfaces are described.

SH-07 SAFETY SIGNS, LABELS, TAGS, AND COLOR CODES

A uniform system of signs, labels, tags, and markings is used to warn against a wide range of hazards. Specifications, including size, color, and purpose, are given for signs that indicate danger, caution, exits, directions, biological hazards, traffic, and safety instructions.

SH-08 RECOGNIZING JOB HEALTH HAZARDS

Chemical, physical, and biological health hazards are discussed, including contamination, effects, and protective mechanisms.

SH-09 RECOGNIZING JOB SAFETY HAZARDS

Employer and employee responsibilities in the recognition and correction of job safety hazards are delineated. Common safety hazards pertaining to fire, machine guards, electrical equipment, apparel, tripping, housekeeping, and lifting are described.

SH-10 STRUCTURAL EGRESS AND EMERGENCY PROCEDURES

Egress requirements are given and discussed, including specifications for exits, illumination of exits, and provisions for fire, smoke, fumes, and panic. The importance of emergency plan procedures and their implementation is stressed.

SPECIFIC MODULES

The remaining 40 modules contain information useful to at least one but less than all of the seven occupational clusters. Thirty-six of the 40 specific modules have been selected as being useful for the Trade and Indus-

trial Education cluster. The following descriptions provide some insight into their content:

SH-11 BUSINESS AND OFFICE SAFETY

The number and types of business and office injuries are presented. Office safety hazards and their control are discussed. Fire and health protection are described.

SH-12 PERSONAL PROTECTIVE EQUIPMENT

The student is instructed in the selection, use, and care of personal protective clothing and equipment, including safety helmets, hearing protectors, face and eye protective equipment, respirators, safety belts, and protective clothing and footwear. OSHA requirements governing protective equipment are reviewed.

SH-13 INDUSTRIAL SANITATION AND PERSONAL FACILITIES

Industrial health and sanitation encompass the areas of water, sewage and garbage, personal facilities, food services, and heating and ventilation. Terminology relating to and regulations governing these areas are given.

SH-14 USING ROPES, CHAINS AND SLINGS SAFELY

This module discusses in detail the use, care, inspection, and maintenance of fiber ropes, wire ropes, chains and slings. OSHA regulations and consensus standards relating to this equipment and its use are presented.

SH-16 MATERIAL HOIST SAFETY

Safety features for inside and outside material hoistways and for material hoist platforms are described. Hand-operated crane hoists, electric hoists, and air hoists and their safety features are discussed.

SH-17 MECHANIZED OFF-ROAD EQUIPMENT SAFETY

Use of off-road equipment can be hazardous if care is not taken to protect persons, property, and utilities in the area. Particular emphasis is given to vehicle operation and operator requirements, protective equipment, and haul road hazards. Techniques for using power shovels, cranes, motor graders, bulldozers, and scrapers are given.

SH-18 SAFE OPERATION OF COMMERCIAL VEHICLES

Causes of vehicle accidents and rationale for accident control introduce this module, which discusses commercial vehicle safety practices. Recommended safety devices and preventive maintenance for motorized trucks are covered, as well as procedures for loading and unloading trucks. One section deals with special precautions for trucking hazardous materials.

SH-19 SAFETY WITH HAND AND PORTABLE POWER TOOLS

Tool control for hand and portable power tools is discussed. The types of hand tools are presented, and their care is described. Hazards, handling procedures, and safety devices of various portable power tools are discussed.

SH-20 PRECAUTIONS FOR EXPLOSIVE MATERIALS

After introducing terminology, the regulations and safety precautions governing use, transportation, and storage of explosives are described.

SH-21 MARINE AND LONGSHORING SAFETY

An introduction to longshoring safety regulations is given. Safety precautions pertaining to means of access, proper care of working surfaces, and proper procedures for opening and closing hatches are discussed.

SH-22 LADDER AND SCAFFOLDING SAFETY

Types of ladders and scaffolds are described, as are their use and maintenance. OSHAct requirements and specific safety rules are discussed in detail.

SH-23 WAREHOUSING, STORAGE AND RETRIEVAL SAFETY

Prevention of material storage and handling accidents and injuries is the main topic of this module, which presents the proper techniques for manual handling, including the use of hand tools and storage of various types of materials. Regulations governing shipping and receiving areas are also discussed.

SH-24 MACHINE AND WOODWORKING TOOL SAFETY

Boring, turning, milling, planing, grinding, and woodworking machines are described, listing common causes of worker injury. Safety rules and protective devices and equipment as they relate to machines and woodworking equipment are presented.

SH-25 SAFETY FEATURES OF MATERIAL AND PERSONNEL MOVEMENT DEVICES

Topics discussed include safety features and practices for such devices as conveyors, lift trucks, motorized hand trucks, aerial bucket devices, elevators, escalators, moving walks, and man lifts.

SH-26 SAFETY FOR COMPRESSED GAS AND AIR EQUIPMENT

Compressed gas cylinders can be extremely dangerous if not handled carefully. This module discusses regulations and general safety considerations for handling, storing, and using these cylinders and related equipment such as manifolds, outlet headers, regulators, hoses, hose connections, and torches.

SH-28 WELDING, CUTTING AND BRAZING SAFETY

Gas and electric welding are discussed, with emphasis on specific safety precautions and regulations governing each.

SH-29 HAZARDOUS MATERIALS SAFETY

General characteristics of combustible, flammable, explosive, poisonous, and corrosive hazardous materials are discussed, with special emphasis on compressed gases, flammable and combustible liquids, combustible solids, explosives, radiation, and corrosives.

SH-30 SAFE HANDLING AND USE OF FLAMMABLE AND COMBUSTIBLE MATERIALS

Properties and classifications of flammable and combustible materials are presented, with safety measures to be taken in the storage, transportation, and use of these materials. Special emphasis is placed on liquefied petroleum gas.

SH-31 OVERCURRENT AND ELECTRICAL SHOCK PROTECTION

Basic electrical terminology and specific methods for grounding techniques to prevent electrical shock are reviewed. Overcurrent circuit interrupters and their use are discussed in detail.

SH-32 WORKING SAFELY IN CONFINED SPACES

The classification of confined spaces is discussed, with safety fundamentals for each type. Emphasis is placed on safety procedures for working in boilers and unfired pressure vessels.

SH-33 VIBRATION AND NOISE CONTROL

A definition of noise, measurement techniques, parts of noise problems, and best method of control procedures are outlined in this module. Personal protective services and maximum exposure limits are described for various workplace conditions.

SH-34 SAFETY GUARDS FOR MACHINERY

The importance of machine guards is explained. Guard types, specifications, and maintenance are detailed, and practices for employees working with guarded machinery are described.

SH-35 IONIZING AND NONIONIZING RADIATION PROTECTION

Radiation comes in many forms and can have a wide range of effects on personnel exposed to it. Specific health concerns are detailed, as well as regulations established for protection against each type of hazard.

SH-36 SAFETY FEATURES FOR FLOOR AND WALL OPENINGS AND STAIRWAYS

Protection is discussed on floor openings, wall openings, open-sided floors, platforms, runways, and stairways. Fabrication specifications are explained.

SH-37 SAFETY OF CONCRETE, FORMS, AND SHORING

Personal protection for personnel working with concrete is discussed. Other topics include reinforcing steel placement, bulk concrete handling, concrete placement, shoring, and tilt-up construction.

SH-38 EXCAVATING, TRENCHING, AND SHORING SAFETY

Excavating, trenching, and shoring are defined. Excavating and trenching hazards such as soil structure, utilities, weather conditions, superimposed loads, and vibrations are discussed. Safety precautions and policies for excavating, trenching, and shoring are described, in-

cluding means of supporting excavations, weather precautions, and inspections.

SH-39 STEEL ERECTION SAFETY

The basic equipment for steel erection is introduced. Operations and equipment are discussed, erection during plant operations is also discussed, and safety practices are described. Lateral bracing is discussed. The requirements for temporary flooring are presented.

SH-40 ELECTRICAL POWER TRANSMISSION AND DISTRIBUTION SAFETY

Prework inspections, protective equipment, grounding, guards, tagging, and signs required for electrical power transmission and distribution safety are discussed. Safety precautions for working at night or near water are outlined. Tools and protective equipment are described. Mechanical lifting equipment, material handling, and underground lines are discussed. Medical and first aid precautions are described.

SH-41 SAFETY PRACTICES FOR DEMOLITION PROCEDURES

Predemolition activites are described in detail, including specifics concerned with different types and characteristics of physical structure. Similarities and differences are described for major and minor demolition activities, and safe debris removal procedures are described for all demolition activities.

SH-42 SAFE USE OF POWERED INDUSTRIAL TRUCKS

Inspection and maintenance of various classifications of powered industrial trucks, guards, and safety devices are discussed. Operating procedures for OSHA certification of operators are explained.

SH-43 SAFETY PRACTICES FOR COMMERCIAL DIVING

Physical requirements for divers are presented. Injuries and the practices to prevent them (including protective clothing and equipment) are discussed. Predive activities are described.

SH-44 EXHAUST, DUST COLLECTION, AND VENTILATION SYSTEMS

Types of exhaust, dust collecting, and ventilation systems are described, as well as their functions, use, and effectiveness.

SH-46 CHEMICAL HAZARDS AND WASTE DISPOSAL SAFETY AND HEALTH

Chemical hazards are introduced, and types of chemical hazards and safety precautions for working with chemicals are discussed. Ventilation of areas, chemical toxicity, specific chemical hazards, and waste disposal for chemicals are included.

SH-47 SAFETY AND HEALTH IN VOCATIONAL EDUCATION

The Williams-Steiger Occupational Safety & Health Act of 1970 is discussed, and functions of safety and health programs in vocational education are presented. Program design is outlined, and methods for gaining support are described.

SH-48 OSHA TRAINING PROGRAMS

This module covers training requirements, organization of the OSHA Training Institute, educational programs available through the National Institute for Occupational Safety and Health, services available from the National Safety Council, types of academic programs in safety and health, and other training programs.

SH-49 ESTABLISHING A COMPANY SAFETY AND HEALTH PROGRAM

The organization of a company safety program is outlined, and inspection and control procedures are described. Accident records and injury rates are discussed, with methods of accident investigation and analysis.

While each module has been assigned a number in sequence, there is no implied priority of presentation. Each module is fundamentally self-contained, allowing most to be used without regard to any numerical sequence. There are no prerequisites for the modules.

SECTION III

MODULE DESIGN AND USE

Each of the 50 JSHIM modules contains the following components:

Introduction - A synopsis of what is presented and why.

Objectives - Measurable objectives that relate to the content of each module are presented, and the objective's page location in the subject matter is noted.

Subject Matter - For most modules, this consists of 20 to 25 pages of content, with all content related to one of the stated objectives.

Activities - Following each portion of subject matter related to an objective is a question for the student to answer as an indication of mastery of that objective.

References - Suggestions for supplementary information.

An example module complete with all components may be found in Appendix B.

The basic content of each part will vary with the different modules, but its purpose and function remain the same. It is recommended that each section be considered when using a given module.

Exact usage techniques may be as varied as the individual instructional approach. Some basic hints, however, may be helpful in identifying some of the various ways in which they can be used. Each module is basically self-contained and could be used in a self-study or self-paced format. However, the optimum method of use is for the modules to be presented by an instructor using the module as a student study guide. Prior to assigning the module, examine the objectives to determine that all content is appropriate for your students. If certain content or objectives are not relevant, advise your students that they will not be held responsible for those sections. In addition, you should provide appropriate activities that will allow your students to practice proper safety and health procedures. Some follow-up activities include:

- Round-table discussions with students or adult groups in the workplace.
- Requiring verbal or written reports related to a single objective or a recent accident from newspaper articles.

- Developing or adding to a job safety and health bulletin board.
- Performing an in-house health and safety hazard survey of the classroom or other facilities.
- Guest speakers from the community, including such people as: Accident victims or their relatives, or people responsible for safety, such as firemen, policemen, or safety engineers for government and private industry.
- Field trips to workplaces similar to those the student will encounter.
- Having local emergency rescue units demonstrate their procedures and discuss problems.
- Constructing simulations that allow students to model or role play circumstances in safety and health.
- Putting health and safety information articles and information in a local or school newspaper.
- Promoting student involvement in local and national safety organizations.

One of the most significant responsibilities of a vocational or occupational instructor is to foster a positive student attitude toward safety and health. The activities listed above should help to build this positive attitude. Your effectiveness in establishing this attitude can be measured by student comments and actions. If you observe safety being willingly practiced in day-to-day activity you can be reasonably assured that a proper attitude has been developed.

Emphasizing your commitment to safety and health by setting the proper example is critical. Properly practiced safety rules will not only reduce work accidents, they also will decrease the possibility of classroom accidents and subsequent instructor liability. Your actions and attitudes toward safety and health will be carefully observed and copied by many students. An example is a situation in which activities dictate that hard hats be worn by all present. If the instructor tells all the students to wear hard hats but chooses not to do the same, students are likely to feel that it is actually unimportant or perhaps childish to wear a hard hat. Similarly, if the attitude of the instructor is conveyed by "I know they are uncomfortable and look weird, but put them on anyway!" a less than positive attitude will prevail. Regardless of the method used to convey safety and health information or the conviction with which it is presented, if it is

not being practiced in the learning environment its credibility will be lost.

Use of accurate, pertinent, and easily understood educational materials is a second way to promote a proper safety attitude. The Job Safety and Health Instructional Materials modules can be used as a source for making transparencies of illustrations, tables, or charts that can be used as teaching aids. Other supplemental information or aids can be found in the Reference section of each module. Modules are organized in a format that permits maximum flexibility and makes them suitable for use by instructors in almost any occupational or vocational area.

Two fundamental methods of presentation can be practiced in safety and health instruction. One method is to organize a separate and distinct safety and health course for students in one vocational area. An advantage of this approach is uniformity of the content presented to each student. Specifically allocated time frames for safety and health instruction are available when using this technique.

A second approach is to insert the safety and health instruction into existing training programs on an as-needed basis. This would benefit instructional programs that have only limited time and/or facilities available for training activities. Additional advantages are realized by the ability to present the exact content desired when it is most relevant to the student's training cycle. For instance, the best time to present information about selecting proper personal protective equipment is immediately before the student needs the information. More specifically, if the student were about to perform a task that required wearing a respirator, the section concerned with respirators of Module SH-12, "Personal Protective Equipment," would be most appropriate.

Modules SH-01 through SH-10 are considered core modules, and they have been recommended for use by all Trade and Industrial Education instructors. Much of the content presented in those first ten modules is basic enough that you might wish to present them as a unit at the beginning of the course. This does not mean that each objective of the ten core modules must be presented; you may select those that are appropriate for your instructional sequence.

As a mechanism for determining the level of previously acquired safety and health knowledge and skills, formative pretests can be conducted. Student activities found in the modules can be used, or separate instruments or procedures devised.

As each module contains distinct subparts relative to each objective, you have the option to present only that part (or those parts) of the module useful to your students in that specific instructional setting. If, at another point in their training cycle, additional information is needed from that module, the additional content can be studied without loss of continuity. Student retention and interest will be enhanced when the principles have an obvious and direct relationship to activities being performed.

If a group presentation format is used, visuals found in the modules can be made into overhead transparencies for ease of discussion. Other sources of safety and health information and mediated materials for Trade and Industrial Education can be found in a special "State-of-the-Art Report" prepared for the JSHIM project.

SECTION IV

SPECIAL–NEEDS STUDENTS IN TRADE AND INDUSTRIAL EDUCATION

The Civil Rights Act of 1964 and the Rehabilitation Act of 1973 placed responsibility on the employer to set goals and timetables - and to prepare guidelines for affirmative action - that include employing the handicapped. As a result of these legislated acts and a growing need for more labor trained in vocational areas, increasing numbers of students with special needs are entering vocational training programs. To satisfy these requirements and ensure that special-needs students have an equal opportunity to be "mainstreamed" into the labor force, certain attitudes and actions must occur.

Many classification schemes are used to categorize handicapped workers and individuals. Those students and workers with physical handicaps usually can be divided into three groups. The three groups include those with:

- Hearing impairments.
- Visual impairments.
- Orthopedic impairments.

Some special consideration should be recognized if you have one of these students in your training program.

A deaf or hearing-impaired student will have difficulty reacting to verbal cues such as warnings or directions. Emergency alarm systems should be equipped with easily visible, flashing lights. As an added precaution, it is advisable to assign someone to help the worker identify the existence of an emergency or pending danger. A machine or tool that may be about to malfunction, or even explode, often will begin to make unusual noises before the problem actually occurs. The "buddy system" would permit a fellow worker with normal hearing to identify the problem for the hearing-impaired worker. The buddy also could help to turn off the machine or tool and clear the area.

The visually-impaired or blind student may have no difficulty in hearing warnings, but may have difficulty in leaving an area if unknown obstacles are present. These workers normally adapt quickly to their surround-

ings and, provided that no furniture, machinery, or materials are blocking the path, they can move to safety in an emergency. Warning labels on hazardous materials containers should have braille interpretations or should be identified for the student. Storage of hazardous materials in an appropriate cabinet may also prevent accidental use of an unknown chemical.

Orthopedically-impaired workers may require structural or mechanical modifications to the workplace, depending on the type of handicap. Those confined to wheelchairs may need ramps for moving from one level to another. Aisles should be clear, and wide enough to permit easy movement. If wall-mounted tools or switches are to be used, either they should be within easy reach, or adaptations should be made for their use. Other types of modifications may be necessary for other orthopedically-impaired workers. The boring of a hole in a piece of stock material with a drill press is frequently a two-handed job. If the worker has only one hand available, one of two alternatives can be employed. The first is to attach a foot-feed to the press to allow the worker to use a foot to lower the drill. The other alternative is to provide a stage clamp to secure the stock in position so that it is not necessary to hold it. The stage clamp allows the operator to use the hand-operated lowering mechanism.

Most students and workers with permanent handicaps have learned to compensate for their "apparent" handicaps. Many can accomplish amazing feats in spite of what we perceive as insurmountable odds. Development of a positive attitude concerning the ability of these students to function in the workforce is extremely important.

An attitude must be developed that includes caring, understanding, and the belief that handicapped workers are capable of achieving exactly what you believe they are capable of achieving. Some special consideration may be required, perhaps including increased time and practice, to master certain activities. In some vocational programs Individualized Educational Plans (IEPs) documenting specific training programs for individual students have been used to identify the exact need.*

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*Conaway, Charlotte. "Vocational Education Serves the Handicapped." Voc Ed, Vol. 56, No. 3, April 1981, pages 22-25.

Each state provides special resource people to assist vocational educators with designing programs and suggesting techniques for training the handicapped student. Other state and local agencies such as those involved in rehabilitation may provide local support. Some individual schools provide professionals and paraprofessionals who move around to assist handicapped students in vocational classes containing nonhandicapped students. These persons can act as tutors, translators, facilitators, or whatever is needed to help the handicapped student successfully complete the training program.

Two other considerations should be recognized by instructors and employers. Structural accommodation and nonhandicapped employee awareness programs are both key factors for a safe and successful employment program of the handicapped.

Structural accommodations should include only those modifications necessary to allow safe movement of the handicapped employee. One of the most obvious examples is the need for ramps for use by wheelchair-bound employees.

Employers should also be encouraged to develop awareness programs for their nonhandicapped employees. These programs should encourage fellow employees to understand that the handicapped worker is expected to perform the assigned duties without placing an additional burden on other employees.

All 34 of the previously identified program areas in Trade and Industrial Education contain occupations that could be filled by handicapped employees. Many of these workers have special needs unrelated to physical handicaps including the need for assistance in understanding the English language. Inability to read basic warning labels and signs poses added dangers for these workers. Instructors and employers should develop programs to eliminate this problem. The use of international symbolism in signs is a fundamental help in that attempt.

If these suggestions are considered, handicapped or special-needs workers can successfully complete a safe and meaningful vocational program. And they can become productive and safe members of the labor force.

SECTION V

SAFETY AND HEALTH CERTIFICATION FOR STUDENTS

Traditionally, when a person satisfactorily completes a course of instruction, some recognition is granted. Often the recognition is in the form of a certificate issued by the institution or organization responsible for the instruction. This certificate becomes an official symbol displayed with pride by the recipient. A Safety and Health Certificate is particularly important to the new employee and the employer if it implies that the employee has demonstrated an understanding of the basic safety and health aspects relevant to the particular job.

Most employers are aware that documented safety and health training received by their employees is beneficial to them in the event of an OSHA inspection, and they will appreciate the fact that the employee holds a certificate and your institution maintains records to verify that training. Employers also will feel more confident about the safety of their workplaces when they hire people who already possess positive safety and health attitudes.

Three factors normally determine the credibility of the certificate:

- Reputation of the issuing institution.
- Instructor.
- Content of materials used during the course of study.

For safety and health instruction, a fourth factor must be considered; namely, the relationship of the content to federal safety and health regulations. All 50 JSHIM modules were designed to enable the student to recognize safety and health hazards and to understand the fundamental aspects of compliance with federal health and safety requirements. While the Occupational Safety and Health Administration (OSHA) does not certify training programs, OSHA representatives have been active on the nationally-based advisory committee formed to guide this project, and they have reviewed each of the 50 modules and have made constructive suggestions that have been incorporated.

The Center for Occupational Research and Development has attempted to structure the content of the materials to be accurate and relevant to current safety practices and regulations. The institution and the instructor who provide the training must be responsible for certifying that the information was accurately presented and that the student achieved the desired level of competency (80% mastery of objectives).

When an institution purchases modules from CORD, the same number of certificates as sets of modules will be sent to the institution. These certificates will require the signatures of two people; the faculty member who presents the instruction and the administrator of the institution. The certificate will state that the student has satisfactorily completed a particular number of hours of instruction in safety and health and will be presented to each student who successfully completes the training. A facsimile of the certificate is shown in Figure 1.

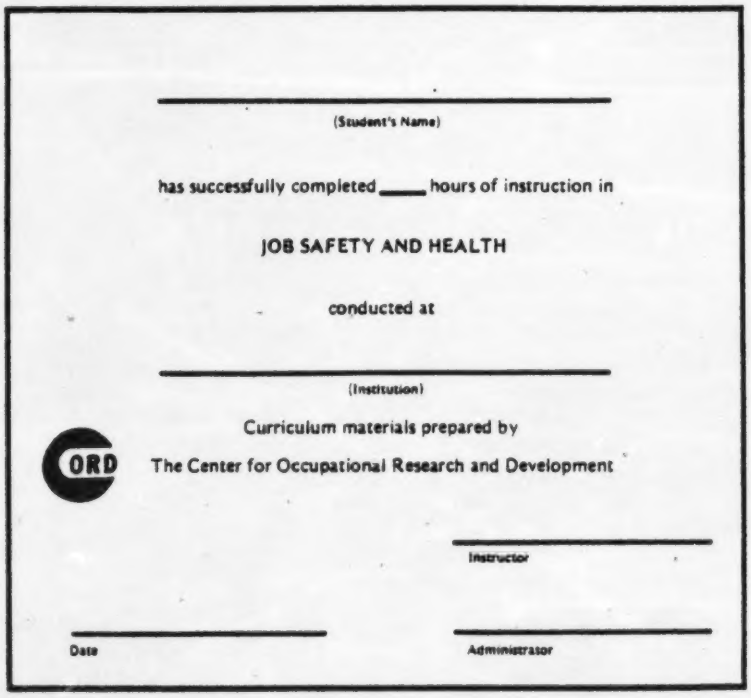
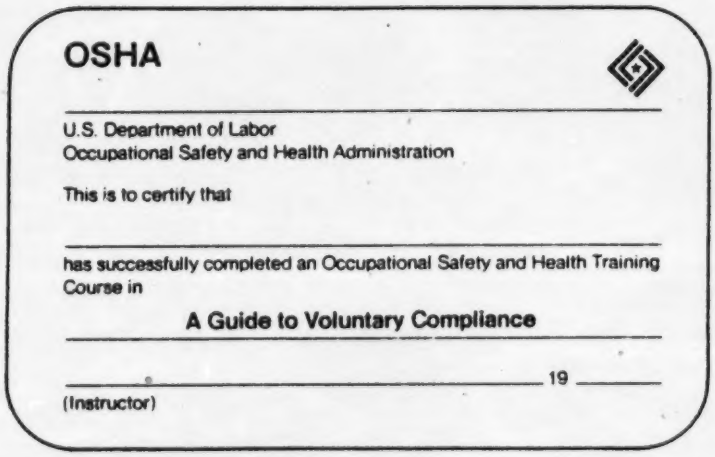


Figure 1. Facsimile of safety and health training certificate.

Your institution may wish to be able to present official wallet-sized OSHA certificates to students who complete your training course. This is possible if the instructor has received training from the Occupational Safety and Health Training Institute located at 1555 Times Drive, Des Plaines, IL 60018. The OSHA Training Institute serves mainly to train compliance officers, but the following three courses are available to the general public free of charge.

- A Guide to Voluntary Compliance (for instructors).
- Basic Instructor Course in Occupational Safety and Health Standards for the Construction Industry.
- Intermediate Guide to Voluntary Compliance in the Health Area.

These courses are offered several times annually. The certificate available for your students is shown in Figure 2.


OSHA

U.S. Department of Labor
Occupational Safety and Health Administration

This is to certify that

_____

has successfully completed an Occupational Safety and Health Training Course in

A Guide to Voluntary Compliance

_____ 19 _____

(Instructor)

Figure 2. Official certificate from OSHA Training Institute.

APPENDIX A

JOB SAFETY AND HEALTH INSTRUCTIONAL MATERIALS
MODULE TITLES

JOB SAFETY AND HEALTH INSTRUCTIONAL MATERIALS
MODULE TITLES

SH-01 Materials Handling
SH-02 The Role of OSHA in Safety and Health
SH-03 Fundamentals of Electrical Safety
SH-04 First Response to Medical Emergencies
SH-05 Fire Prevention and Emergency Procedures
SH-06 Walking and Working Surfaces
SH-07 Safety Signs, Tags, and Color Codes
SH-08 Recognizing Job Health Hazards
SH-09 Recognizing Job Safety Hazards
SH-10 Structural Egress and Emergency Procedures
SH-11 Business and Office Safety
SH-12 Personal Protective Equipment
SH-13 Industrial Sanitation and Personal Facilities
SH-14 Using Ropes, Chains and Slings Safely
SH-15 Agribusiness Safety
SH-16 Material Hoist Safety
SH-17 Mechanized Off-Road Equipment Safety
SH-18 Safe Operation of Commercial Vehicles
SH-19 Safety with Hand and Portable Power Tools
SH-20 Precautions for Explosive Materials
SH-21 Marine and Longshoring Safety
SH-22 Ladder and Scaffolding Safety
SH-23 Warehousing Storage and Retrieval Safety
SH-24 Machine and Woodworking Tool Safety
SH-25 Safety Features of Material and Personnel Movement Devices
SH-26 Safety for Compressed Gas and Air Equipment
SH-27 Safety in Elevators and Grain Handling Facilities
SH-28 Welding, Cutting and Brazing Safety
SH-29 Hazardous Materials Safety
SH-30 Safe Handling and Use of Flammable and Combustible Materials

SH-31 Overcurrent and Electrical Shock Protection
SH-32 Working Safely in Confined Spaces
SH-33 Vibration and Noise Control
SH-34 Safety Guards for Machinery
SH-35 Ionizing and Nonionizing Radiation Protection
SH-36 Safety Features for Floor and Wall Openings and Stairways
SH-37 Safety of Concrete, Forms, and Shoring
SH-38 Excavating, Trenching, and Shoring Safety
SH-39 Steel Erection Safety
SH-40 Electrical Power Transmission and Distribution Safety
SH-41 Safety Practices for Demolition Procedures
SH-42 Safe Use of Powered Industrial Trucks
SH-43 Safety Practices for Commercial Diving
SH-44 Exhaust, Dust Collection, and Ventilation Systems
SH-45 Coast Guard Regulations Applied to Offshore Drilling
SH-46 Chemical Hazards and Waste Disposal Safety and Health
SH-47 Safety and Health in Vocational Education
SH-48 OSHA Training Programs
SH-49 Establishing a Company Safety and Health Program
SH-50 Agricultural Chemical and Pesticide Hazards

APPENDIX B

MODULE SH–22
"LADDER AND SCAFFOLDING SAFETY"

(see CE 031479)